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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/620,162	07/20/2000	Thomas H. Baum	249-Div.	2598

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Oliver A Zitzmann
Advanced Technology Materials Inc
7 Commerce Drive
Danbury, CT 06810

EXAMINER	
MARKHAM, WESLEY D	
ART UNIT	**PAPER NUMBER**
1762	

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/620,162	Applicant(s) BAUM ET AL.
	Examiner Wesley D Markham	Art Unit 1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/16/2004 (the RCE)*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-17,19,21 and 28-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-17,19,21 and 28-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 July 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application on 9/16/2004 after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office Action (i.e., the final Office Action mailed on 3/22/2004) has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/23/2004 has been entered.

Response to Amendment

2. Acknowledgement is made of the amendment filed by the applicant on 8/23/2004, in which Claims 1 and 28 were amended. **Claims 1 – 5, 7 – 17, 19, 21, and 28 – 30** are currently pending in U.S. Application Serial No. 09/620,162, and an Office Action on the merits follows.

Drawings

3. The formal drawings (12 sheets, 12 figures) filed on 7/20/2000 are approved by the examiner.

Claim Objections

4. The objection to Claim 28, set forth in paragraph 3 of the previous Office Action, is withdrawn in light of the applicant's amendment to correct the typographical error noted by the examiner.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1 – 5, 7 – 17, 19, 21, and 28 – 30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, amended independent **Claim 1** (from which **Claims 2 – 5, 7 – 17, 19, 21, and 28 – 30** depend) requires that the manganate material have a Curie temperature that is between 273 K and 324 K. The applicant relies on this limitation to attempt to distinguish the claimed invention from the prior art (see the "REMARKS" section of the response filed on 8/23/2004). After carefully reviewing the applicant's specification as originally filed, the examiner notes that there are a number of references to a range of Curie temperatures to which the invention is

directed (e.g., room temperature and above, above 290 K, 150 – 294 K (as deposited), etc.), none of which reasonably suggests the range of Curie temperatures now claimed by the applicant (i.e., between 273 and 324 K). Additionally, if one examines Table I and Table II on page 17 of the applicant's originally filed specification, one notes that there are numerous examples of materials produced according to the applicant's invention that have Curie temperatures outside the presently claimed range, along with numerous examples having Curie temperatures within the applicant's claimed range. As such, the claims contain subject matter (i.e., the specific range of Curie temperatures of "between 273 K and 324 K") that was not described in the specification in such a manner as to reasonably convey to one skilled in the art that the inventors had possession of the claimed invention at the time of filing.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. **Claims 1 – 5, 7 – 17, 19, 21, 29, and 30** are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted step is <u>annealing the manganate material in oxygen</u>. Specifically, independent Claim 1 requires that the manganate material have a Curie temperature that is between 273 and 324 K. However, as shown by the applicant in Tables I and II (page 17 of the

specification as originally filed), the only way disclosed by the applicant to obtain a manganate material having a Curie temperature that is above about 300 K is to anneal the material. As such, the step of annealing the manganate material is critical to the practice of the claimed invention (i.e., critical to obtain a manganate material having a Curie temperature in the upper portion of the range claimed by the applicant). Please note that Claim 28 has not been rejected on this grounds because Claim 28 does require annealing the manganate material in oxygen.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1 – 4, 7 – 17, 19, 21, and 28 – 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jin et al. (USPN 5,461,308) in view of Li et al. (USPN 5,487,356).

10. Regarding independent **Claim 1** (from which Claims 2 – 4, 7 – 17, 19, 21, and 28 – 30 depend), Jin et al. teaches a method of forming a magnetoresistive, doped manganate material "21" on a substrate "20" (Figure 2 and Col.2, lines 11 – 19) by a technique such as chemical vapor deposition (Col.2, lines 41 – 46), the manganate material having the general formula $A_wB_xC_yO_z$, where A is preferably La (as claimed by the applicant); B is preferably Mg, Ca, Sr, or Ba (as claimed by the applicant); C is preferably Mn (as claimed by the applicant); $0.5 \leq w \leq 0.7$; $0.15 \leq x \leq 0.50$; $0.8 \leq y \leq 1.2$; and $2.7 \leq z \leq 3.3$ (Col.3, lines 33 – 44). The range of "y" values (i.e., the stoichiometric value of Mn) taught by Jin et al. (i.e., 0.8 to 1.2) encompasses the applicant's claimed stoichiometric value of Mn (i.e., 1), and the range of "z" values (i.e., the stoichiometric value of O) taught by Jin et al. (i.e., 2.7 to 3.3) encompasses the applicant's claimed stoichiometric value of O (i.e., 3). Jin et al. does not explicitly teach that the A-site filling value (i.e., the sum of "w + x" as defined in Jin et al., or, in the applicant's claimed terms, the sum of "x + y") is between 0.5 and 0.9. However, the ranges of "w" and "x" taught by Jin et al. lead to an A-site filling value of between 0.5 and 0.9, and thus the A-site deficient manganate material of the applicant's claims. For example, if the "x" value of Jin et al. (i.e., the stoichiometric value of Mg, Ca, Sr, or Ba) is chosen to be 0.15 (a preferred embodiment of Jin et al.) and the "w" value of Jin et al. (i.e., the stoichiometric value of La) is chosen to be any value from

0.5 to 0.7, inclusive, as preferred by Jin et al., an A-site filling value of from 0.65 to 0.85 is obtained. This value is within / encompassed by the applicant's claimed "x + y" value of between 0.5 and 0.9. Please note that, in the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists (*In re Wertheim* 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)). Also, a prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness (*In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003)). Jin et al. does not teach the specifics of the CVD process that is utilized to deposit the magnetoresistive manganate material, specifically the step of liquid delivery and flash vaporization of precursor(s) to yield a precursor vapor, and transporting the precursor vapor to a CVD reactor for chemical vapor deposition formation of the manganate material on the substrate. Li et al. teaches a method of forming a doped, magnetoresistive manganate film on a substrate from corresponding precursors, the method comprising liquid delivery and flash vaporization of the precursors to yield a precursor vapor, and transporting the precursor vapor to a CVD reactor for the CVD formation of the manganate film on the substrate (Abstract, Figure 1, Col.3, lines 37 – 53, Col.7, lines 44 – 65, and Col.8, lines 30 – 52). Further, Li et al. teaches that their CVD method is used to deposit films having a giant magnetoresistance (GMR) effect, the films having a general formula $(La_{1-x}A_x)MnO_3$, wherein A is selected from the group consisting of Ba, Ca, Mn, and Sr (Abstract). In other words, Li et al.

teaches that the liquid delivery / flash vaporization CVD process and apparatus can be successfully used to deposit magnetoresistive films (as desired by Jin et al.) having a composition almost identical to the films taught by Jin et al. (i.e., except for the A-site deficiency). In addition, Li et al. teaches that their CVD method is particularly attractive for forming these types of layers because (1) it is readily scaled up to production runs and the control of key variables such as oxygen partial pressure during deposition, film stoichiometry, and film thickness is most feasible with CVD (Col.2, lines 52 – 65), and (2) the controlled delivery of CVD reagents can be achieved (Col.3, lines 37 – 53). Therefore, it would have been obvious to one of ordinary skill in the art to deposit the A-site deficient manganate materials of Jin et al. by using the liquid delivery / flash vaporization CVD process of Li et al. (i.e., the liquid delivery and flash vaporization of the precursors to yield a precursor vapor, and transporting the precursor vapor to a CVD reactor for the CVD formation of the manganate film on the substrate) with the reasonable expectation of (1) success, as Jin et al. teaches that the films can be deposited by CVD in general, and Li et al. teaches a specific type of CVD that is suitable to deposit magnetoresistive manganate films (i.e., such as the films taught by Jin et al.), and (2) obtaining the benefits of using the CVD process of Li et al. to deposit the films of Jin et al., such as the ability to readily scale up the process to production runs and to control key variables such as the delivery of the precursors, the oxygen partial pressure during deposition, the film thickness, and, importantly, the film stoichiometry. Additionally, Jin et al. does not explicitly teach that the manganate material has a Curie

temperature that is between 273 K and 324 K. However, Jin et al. does teach that the material should have a Curie temperature higher than the sensor operating temperature (i.e., room temperature, which is about 300 K) (Col.3, lines 28 – 32). As such, Jin et al. reasonably suggests that the material should have a Curie temperature above 300 K, a range that overlaps the applicant's claimed range. Additionally, Li et al. teaches that the Curie temperature of a manganate material can be controlled by post-growth annealing in oxygen (Col.8, lines 4 – 9 and 53 – 61). Based on these teachings, it would have been obvious to one of ordinary skill in the art to control the Curie temperature of the manganate material to be, for example, above 300 K (e.g., by post-growth annealing in oxygen, as taught by Li et al.) because 300 K is about room temperature, and Jin et al. teaches that the material should have a Curie temperature higher than room temperature, which is the typical sensor operating temperature.

11. The combination of Jin et al. and Li et al. also teaches all the limitations of **Claims 2 – 4, 7 – 17, 19, 21, and 28 – 30** as set forth above in paragraph 10 and below, including a method wherein / further comprising:

- Claim 2 – The precursors comprise coordination compounds, or Lewis base complexes of metals selected from the group consisting of lanthanum, magnesium, calcium, strontium, barium, and manganese (Col.4, lines 12 – 68, Col.5, lines 1 – 45 and 65 – 67, and Col.6, lines 1 – 40 of Li et al.).

- Claim 3 – The precursors include metal β-diketonate compounds, metal pivalate compounds, or Lewis base complexes thereof (Col.6, lines 1 – 25, and Col.8, lines 30 – 52 of Li et al.).
- Claim 4 - The precursors include metal fluorinated β-diketonate compounds, or Lewis base complexes thereof (Col.6, lines 6 – 7 of Li et al.).
- Claim 7 – The precursors are dissolved in a solvent and flash vaporized at a temperature of from about 100° C to about 300° C (Col.6, lines 11 – 26, Col.7, lines 30 – 42, and Col.8, lines 30 – 52 of Li et al.). Specifically, Li et al. teach that a vaporizer temperature of 220° C is suitable (Col.7, line 37).
- Claim 8 – The precursor vapor is transported to the CVD reactor in a carrier gas (Col.7, lines 30 – 57, and Col.8, lines 30 – 52 of Li et al.).
- Claim 9 – The carrier gas is selected from the group consisting of argon, nitrogen, neon, helium, and ammonia (Col.6, lines 56 – 57, and Col.8, lines 47 – 48 of Li et al.).
- Claim 10 – The carrier gas is mixed with an oxidizing co-reactant gas in the CVD reactor or prior to transport to the CVD reactor (Col.6, lines 56 – 63, and Col.7, lines 44 – 56 of Li et al.).
- Claim 11 – The substrate in the CVD reactor is heated to a temperature in the range of about 300° C to about 1000° C (Col.7, lines 24 – 30, and Col.8, lines 49 – 51 of Li et al.).

- Claim 12 – The pressure of the precursor vapor in the CVD reactor is from about 0.1 to about 760 torr. Specifically, Li et al. teach reactor pressures of about 1.5 Torr (Col.7, line 35, and Col.8, lines 49 – 50).
- Claim 13 – The CVD is plasma-assisted (Col.7, lines 56 – 59 of Li et al.).
- Claim 14 – The precursors comprise a mixture of compounds selected from the group consisting of $La(thd)_3$, $Ca(thd)_2$, and $Mn(thd)_3$ (Col.8, lines 30 – 45 of Li et al.).
- Claim 15 – The precursors comprise a mixture of the compounds selected from the group consisting of $La(thd)_3$, $Sr(thd)_2$, and $Mn(thd)_3$ (Col.8, lines 30 – 45). Specifically, Li et al. teaches a mixture comprising $La(thd)_3$ and $Mn(thd)_3$.
- Claim 16 – The precursors comprise a mixture of Lewis base adducts of metal β-diketonate precursors (Col.6, lines 1 – 10 and 27 – 40 of Li et al.).
- Claim 17 – M is Ca and (La+Ca) < 0.9 in the A-site deficient manganate film. Specifically, Jin et al. teaches that "A" in their formula is La and "B" in their formula is Ca, as well as reasonably suggesting "A + B" (i.e., La + Ca) values of 0.65 to 0.85 (i.e., values in the range claimed by the applicant) (see paragraph 10 above).
- Claim 19 – M is Sr and (La+Sr) < 0.9 in the A-site deficient manganate film. Specifically, Jin et al. teaches that "A" in their formula is La and "B" in their formula is Sr, as well as reasonably suggesting "A + B" (i.e., La + Sr)

values of 0.65 to 0.85 (i.e., values in the range claimed by the applicant) (see paragraph 10 above).

- Claim 21 – M is Ba and (La+Ba) < 0.9 in the A-site deficient manganate film. Specifically, Jin et al. teaches that "A" in their formula is La and "B" in their formula is Ba, as well as reasonably suggesting "A + B" (i.e., La + Ba) values of 0.65 to 0.85 (i.e., values in the range claimed by the applicant) (see paragraph 10 above).
- Claim 28 – The manganate material is annealed in oxygen. Specifically, Jin et al. teaches that the manganate material should have a high Curie temperature (Col.3, lines 28 – 32). Li et al. teaches that the properties of the magnetoresistive films deposited by their invention (i.e., films similar to those deposited by Jin et al.) can be improved by post-growth annealing in an oxidizing atmosphere (Col.8, lines 4 – 8). Particularly, Li et al. teaches that annealing the manganate films in O_2 increases the Curie temperature of the films (Col.8, lines 58 – 61). Therefore, it would have been obvious to one of ordinary skill in the art to anneal the films deposited by the method of the combination of Jin et al. and Li et al. in oxygen (as taught by Li et al.) with the reasonable expectation of successfully and advantageously improving the properties of the film(s) and achieving a Curie temperature desired by Jin et al.
- Claim 29 – The (La + Ca):Mn ratio is between 0.6 and 0.9. Specifically, Jin et al. reasonably suggests (La + Ca) values of from 0.65 to 0.85,

which are within the applicant's claimed range, when compared to an Mn value of 1 (see discussion of Claim 17 above).

- Claim 30 – The Ca/La ratio is between 0.35 and 0.55. Specifically, Jin et al. teaches that "A" in their formula is La and "B" in their formula is Ca (Col.3, lines 33 – 39). Jin et al. also teaches "x" values (i.e., the stoichiometric value of Ca) of from 0.15 to 0.50, inclusive, and "w" values (i.e., the stoichiometric value of La) of from 0.5 to 0.7, inclusive (Col.3, lines 29 – 41). Therefore, by selecting an "x" value in the preferred range taught by Jin et al., for example x=0.2, and a "w" value in the preferred range taught by Jin et al., for example w=0.5, a Ca/La ratio of 0.2/0.5 = <u>0.4</u> is obtained. This value is within the applicant's claimed range.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jin et al. (USPN 5,461,308) in view of Li et al. (USPN 5,487,356), and in further view of Vaartstra (USPN 6,010,969), Donley (USPN 3,658,568), and Bloss et al. (USPN 4,857,361).

13. The combination of Jin et al. and Li et al. teaches all the limitations of **Claim 5** as set forth in paragraph 10 above, except for a method wherein the precursors include metal pivalate Lewis base adducts. However, Li et al. does teach that suitable ligands that are used in the metal / ligand precursors of their invention include beta-diketonates such as acetylacetonates. In addition, Li et al. teaches that Lewis base complexing components that coordinate with the metal centers of the precursors are

used to increase the volatility of the source reagents and to facilitate their transport to the CVD reactor (Col.6, lines 1 – 10 and 27 – 40). Vaartstra teaches that, in the art of forming oxide films by flash vaporization CVD on a substrate (Col.1, lines 40 – 58, Col.2, lines 1 – 8, and Col.3, lines 1 – 45), it was known at the time of the applicant's invention to use carboxylate ligands such as pivalate ligands in metal-containing CVD precursors (Col.3, lines 46 – 57). Other ligands such polyamines (i.e., a Lewis base compound) can also be complexed to the metal to increase the precursor's volatility (Col.3, lines 58 – 67). Vaartstra also teaches that a wide variety of metals can be successfully complexed with the carboxylate ligands (Col.5, lines 52 – 61). Donley teaches that, in the art of vapor depositing metal oxide films onto a substrate (Abstract), metal carboxylate precursors such as metal neopentanoates (i.e., metal pivalates – see Col.1, lines 65 – 68, Col.2, lines 1 – 2 of Bloss et al.) are preferred in comparison to metal acetylacetonates because the carboxylates have better solubility, are easier to prepare, and are less expensive (Col.1, lines 43 – 72, Col.2, lines 1 – 23). Therefore, it would have been obvious to one of ordinary skill in the art to utilize metal pivalate Lewis base adducts as taught by Vaartstra as precursors in the CVD process of the combination of Jin et al. and Li et al. with the reasonable expectation of success and with the expectation of obtaining the benefits of using a pivalate precursor as opposed to an acetylacetonate precursor (as taught by Li et al.), such as better solubility, ease of preparation, and reduced cost, as taught by Donley.

Response to Arguments

14. Applicant's arguments filed on 8/23/2004 have been fully considered but they are not persuasive.

15. First, the applicant argues that Jin et al. does not teach or suggest that the manganate material have a Curie temperature that is between 273 K and 324 K and, in fact, teaches away from such a limitation because Jin et al. teaches that the material should have a Curie temperature above 330 K.

16. In response, this argument is not convincing. While the preferred embodiment of Jin et al. is a material with a Curie temperature above 330 K (see Col.3, lines 30 – 32), Jin et al. generally teaches that, "The material should have a ferromagnetic Curie temperature higher than the sensor operating temperature..." (Col.3, lines 27 – 29). Therefore, for room temperature operation (as taught by Jin et al.), Jin et al. reasonably suggests a material having a Curie temperature of above 300 K (i.e., above room temperature), which is a range that overlaps the applicant's claimed range. Please note that a reference may be properly relied upon for all that it teaches or reasonably suggests to one of ordinary skill in the art, and the teachings of a reference are not limited to preferred or exemplary embodiments.

17. Second, the applicant argues that the claimed A-site deficient compounds are not exemplified in Jin, and the fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious (citation omitted).

18. In response, this argument is not convincing. To begin, the applicant's statement that, "the fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious" appears to be accurate. However, in this case, there is a clear motivation to select the subgenus of compounds claimed by the applicant out of the broader genus taught by Jin et al. because the subgenus claimed by the applicant is suggested by Jin et al. to be preferred. Specifically, the manganate material of Jin et al. has the general formula $A_wB_xC_yO_z$, where A is preferably La (as claimed by the applicant); B is preferably Ca, Sr, or Ba (as claimed by the applicant); C is preferably Mn (as claimed by the applicant); and preferably, $0.5 \leq w \leq 0.7$; $0.15 \leq x \leq 0.50$; $0.8 \leq y \leq 1.2$; and $2.7 \leq z \leq 3.3$ (Col.3, lines 33 – 44). Jin et al. does not explicitly teach that the A-site filling value (i.e., the sum of "w + x" as defined in Jin et al., or, in the applicant's claimed terms, the sum of "x + y") is between 0.5 and 0.9 (i.e., that the materials are "A-site deficient" to the extent claimed by the applicant). However, the ranges of "w" and "x" taught by Jin et al. lead to an A-site filling value of between 0.5 and 0.9, and thus the A-site deficient manganate material of the applicant's claims. For example, if the "x" value of Jin et al. (i.e., the stoichiometric value of Mg, Ca, Sr, or Ba) is chosen to be 0.15 (a preferred embodiment of Jin et al.) and the "w" value of Jin et al. (i.e., the stoichiometric value of La) is chosen to be any value from 0.5 to 0.7, inclusive, as preferred by Jin et al., an A-site filling value of from 0.65 to 0.85 is obtained. This value is within / encompassed by the applicant's claimed "x + y" value of between 0.5 and 0.9. In other words, by selecting elements and stoichiometric values

preferred by Jin et al., the applicant's claimed A-site deficient compounds are obtained. In fact, by using an "x" value of 0.15, as taught by Jin et al., <u>it is impossible</u> to choose any "w" value disclosed by Jin et al. that would produce a non-A-site deficient material. This is a far different situation than the situation in *In re Jones* (cited by the applicant), in which the prior art reference encompassed a potentially infinite genus, and there was no suggestion in the art to select the claimed compound(s) out of the infinite genus disclosed by the reference.

19. Third and in order to rebut a *prima facie* case of obviousness, the applicant argues that the claimed Curie temperatures (between 273 and 324 K) are critical because they facilitate widespread magnetoresistive applicability ranging from thin-film sensors to thermal switches, and the magnetoresistors respond to relatively small magnetic fields.

20. In response, this argument is not convincing. After carefully reviewing the applicant's specification as originally filed, the examiner notes that there are a number of references to a range of Curie temperatures to which the invention is directed (e.g., room temperature and above, above 290 K, 150 – 294 K (as deposited), etc.), none of which reasonably suggests the range of Curie temperatures now claimed by the applicant (i.e., between 273 and 324 K), much less the criticality of such a range. Additionally, if one examines Table I and Table II on page 17 of the applicant's originally filed specification, one notes that there are numerous examples of materials produced according to the applicant's invention that have Curie temperatures <u>outside the presently claimed range</u>, along with numerous examples

having Curie temperatures within the applicant's claimed range. As such, there is simply no evidence that the specific range of Curie temperatures now claimed by the applicant is critical to the claimed invention.

21. Fourth, the applicant presents a number of arguments based on the fact that Jin et al. teaches that the material should have a Curie temperature that is at least 30° higher than the sensor operating temperature and for room temperature operation, the material should have a Curie temperature $\geq$ 330 K. The applicant states that, because the Curie temperatures taught by Jin and claimed by the applicant are dissimilar, the magnetoresistive film of Jin will NEVER logically have the stoichiometry claimed by the applicant.

22. In response, this argument is not convincing. While the preferred embodiment of Jin et al. is a material with a Curie temperature above 330 K (see Col.3, lines 30 – 32), Jin et al. generally teaches that, "The material should have a ferromagnetic Curie temperature higher than the sensor operating temperature..." (Col.3, lines 27 – 29). Therefore, for room temperature operation (as taught by Jin et al.), Jin et al. reasonably suggests a material having a Curie temperature of above 300 K (i.e., above room temperature), which is a range that overlaps the applicant's claimed range. Please note that a reference may be properly relied upon for all that it teaches or reasonably suggests to one of ordinary skill in the art, and the teachings of a reference are not limited to preferred or exemplary embodiments.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wesley D Markham
Examiner
Art Unit 1762

WDM
WDM

SHRIVE P. BECK
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700